

CLAIMS

1. Acoustic auditory aid device, generating at least an acoustic signal and designed to be fixed to the body of a patient, including an external casing (1) containing an electronic module (11) for signal processing connected at its input to at least one microphone (13, 13a, 13b) and at its output to an earphone designed to emit an acoustic signal in the external auditory canal (5) of the patient, and an energy source, characterized in that it also includes:

- at least one first magnetic part (12, 12', 12a, 12b) installed in the external casing (1),

- at least one second magnetic part (21, 21a, 21b) installed in an implantable casing (2), designed to be implanted under the patient's skin, at a location of the body where the external casing (1) is to be supported, the first magnetic part being installed in the casing so that a magnetic force of attraction is exerted on the second magnetic part when the external casing (1) is placed at said location, and

- a device for distribution of acoustic signals in the auditory canal of the patient comprising the earphone, and a connection (4) between the external casing (1) and the auditory canal of the patient, with a length such that the microphone can be kept sufficiently distant from the auditory canal to avoid Larsen phenomena.

2. Auditory aid device according to claim 1, characterized in that the first magnetic part (12') is a magnet.

3. Auditory aid device according to claim 1 or 2, characterized in that the second magnetic part (21) is a magnet.

4. Auditory aid device according to one of claims 1 to 3, characterized in that the first and second magnetic parts (12', 21) are permanent magnets, and in that the second magnetic part is installed in the implanted casing (2) so as to present a north-south magnetic axis substantially parallel to the surface of the patient's skin at said location, and the first magnetic part is installed in the external casing (1) so as to present a north-south magnetic axis substantially parallel to the wall of the casing designed to come in contact with the patient's skin.

5 5. Auditory aid device according to one of claims 1 to 3, characterized in that the second magnetic part (21) is a magnet and the first magnetic part consists of two permanent magnets (12a, 12b) arranged in the external casing (1) so as to present north-south magnetic axes substantially perpendicular to the wall of the casing designed to come in contact with the patient's skin, and in opposite directions, these magnetic axes being spaced apart by a distance substantially corresponding to the distance between the poles of the second magnetic part (21).

10 6. Auditory aid device according to one of claims 1 to 3, characterized in that the first magnetic part (12') is a magnet and the second magnetic part consists of two permanent magnets (21a, 21b) arranged in the implanted casing (2) so as to present north-south magnetic axes substantially perpendicular to the surface of the patient's skin at said location, and in opposite directions, these magnetic axes being spaced apart by a distance substantially corresponding to the distance between the poles of the first magnetic part (12').

20 7. Auditory aid device according to one of claims 1 to 3, characterized in that the second magnetic part consists of at least two permanent magnets (21a, 21b) arranged in the implanted casing (2) so as to present north-south magnetic axes substantially perpendicular to the surface of the patient's skin at said location, and alternatively in opposite directions, and the first magnetic part includes as many permanent magnets (12a, 12b) as the first part, the magnets of the first magnetic part being arranged in the casing so as to present north-south magnetic axes substantially perpendicular to the wall of the external casing (1) designed to come in contact with the patient's skin, and alternatively in opposite directions, the magnetic axes of the magnets arranged in the external casing (1) being distributed in a plane substantially parallel to said wall in a configuration substantially corresponding to the distribution configuration of the magnetic axes of the magnets (21a, 21b) in the implanted casing.

35 8. Auditory aid device according to one of claims 1 to 7, characterized in that the second casing (2) is designed to be implanted in the temporal-

occipital area of the patient's skull.

5 9. Auditory aid device according to one of claims 1 to 8, characterized in that the earphone is installed in the external casing (1) and connected to the external auditory canal (5) of the patient by an acoustic tube (4) comprising an intra-auricular end (3), the auditory aid device comprising in addition a mechanical anti-Larsen absorption system.

10 10. Auditory aid device according to one of claims 1 to 8, characterized in that the earphone is placed in the external auditory canal (5) of the patient and forms an intra-auricular end (3) of the connection (4), the connection (4) being made by an electrical cable.

15 11. Auditory aid device according to claim 9 or 10, characterized in that the intra-auricular end (3) of the connection (4) is maintained in the external auditory canal (5) of the patient by means of an intra-auricular support (9) comprising means (8a, 8b, 8c) for centering and maintaining said end (3) in the auditory canal (5).

20 12. Auditory aid device according to one of claims 1 to 11, characterized in that the external casing (1) consists of a base (1b) and a cover (1a) rotatably mounted on the base, and means for locking (25) the angular position of the cover with respect to the base, the second magnetic part (21, 21a, 21b) being fixed to the base, while the microphone(s) (13, 13a, 13b) are
25 fixed to the cover.

30 13. Auditory aid device according to one of claims 1 to 12, characterized in that the implanted casing (2) is connected to at least two electrodes for collection (35, 36) of evoked or spontaneous auditory potentials, the implanted casing (2) containing at least one electronic module (32) for signal collection and processing connected to the collection electrodes, a transmission module (33) connected to an antenna and to the collection and processing module, to transmit to the external casing (1) the signals produced by the collection module as a function of the signals collected by the
35 electrodes, and an electrical power supply (31).

14. Auditory aid device according to claim 13, characterized in that one of the collection electrodes (35, 36) is designed to be installed on the round window.

5 15. Auditory aid device according to one of claims 1 to 14, characterized in that the implanted casing (2) is also connected to at least one active stimulation electrode (38, 39) designed to be positioned in proximity to the inner ear of the patient or in the cochlea, the implanted casing (2) containing at least an electronic stimulation module (37) connected to the
10 stimulation electrodes, a transmission module (33) connected to an antenna and to the stimulation module, the stimulation module (37) being designed to generate electrical stimulation signals that are applied to the stimulation electrodes (38, 39) from signals received from the external casing (1) through the transmission module (33), via the antenna located in the implanted casing.

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16. Auditory aid device according to claim 15, characterized in that one of the active stimulation electrodes (38, 39) is designed to be installed on the round window of the middle ear of the patient.

20 17. Auditory aid device according to one of claims 13 to 16, characterized in that the collection electrodes (35, 36) and the stimulation electrodes (38, 39) are at least partially common.

25 18. Auditory aid device according to one of claims 13 to 17, characterized in that the external casing (1) further comprises a module for signal transmission connected to at least an antenna and to the electronic module (11).

30 19. Auditory aid device according to one of claims 14 to 18, characterized in that the implanted casing (2) is also connected to at least one electromechanical transducing vibrator designed to be positioned in a bony or cartilaginous area in proximity to the inner ear of the patient, the implanted casing (2) containing at least an electronic stimulation module (37) connected to the vibrator, a transmission module (33) connected to an antenna and to the
35 stimulation module, the stimulation module (37) being designed to generate electrical stimulation signals that are applied to the vibrator from the signals

received from the external casing (1) through the transmission module (33), via the antenna located in the implanted casing.